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| **Lesson Title:** Skateboard Lab |
| **Subject area / course / grade level:** 7th grade – physical science |
| **Introduction:**  This lesson can be used as a basic lab activity after discussing motion, acceleration, speed, and mass. Or, it can also be used as a general lab to support the scientific method and the inquiry skills needed in experimenting. |
| **Lesson Length:** 45 mins |
| **Materials:**  skateboard  weights (or weighted materials that can increase in regular increments like books – just be careful)  stopwatches (enough for each group)  Blue painter’s tape (or any other kind, this just comes up easily)  Measuring instrument: tape, meter stick, etc.  Basic data tables  Materials to record data and extend through graphs or tables as needed  Ramp or sloped hall |
| **Lesson Overview:**  Students will record data through a motion experiment and analyze the recorded information. |
| **Tennessee Standards:**  SPI 0707.11.3 – Apply proper equations to solve basic problems pertaining to distance, time, speed, and velocity.  SPI 0707.11.4 – Identify and explain how Newton’s laws of motion relate to the movement of objects. |
| **Lesson objective(s):**  To connect the relationships between speed and mass, and also to practice common procedures during an investigation. |
| **ENGAGEMENT**  Teacher should lead in with what factors affect speed. How can we increase or decrease speed? (other than in a car)  Students should be asking how mass affects speed and how this can be measured in an experiment. |
| **EXPLORATION**  Place a mark with tape at the top of an incline (sloped hallway) and a mark at the bottom. The starting mark needs to be on a part of the hallway that is actually sloped. The bottom mark can be on flat or sloped, it doesn't matter. Measure the distance for the speed calculation.  Ask every student with a stopwatch to start timing when the skateboard is released and stop timing when the skateboard passes the mark. Tell them to measure something specific, like when the nose crosses finish line. If they feel like they messed up on one, ask them to mark that it was a bad observation. Have them keep a record of each time for each test.  Run a **Control** by sending the skateboard down the hall with nothing on it. Then add a small amount of weight and repeat. Add more weight... rinse and repeat. I would probably run each part 3 times or so. For the last experiment we ran when I was at Woodland, I sat on the skateboard and rode it down the hallway. They really got a kick out of that. **Make sure that whoever is releasing the skateboard knows not to push it - they should simply let it go.**  Once you make it back to the classroom, pull up Excel or something and have students read off their results. Enter these results, so that the students can see them compiled. Alternatively, you could take up their sheets. If a student noted that a particular measurement was bad, then don't put it in the list. If you printed enough of these off for each group, you could ask the students to compute the mean for each test. |
| **EXPLANATION**  Have students explain what they think causes different speeds and what we could do to speed up or slow down an object. Discuss how the terrain (incline, decline, etc.) and other factors affect it as well. |
| **ELABORATION**  Students can extend to set up their own experiment to calculate any other factors for speed, or if there is a limit to the increasing mass to increase speed strategy.  Vocabulary: speed, mass, acceleration |
| **EVALUATION**  The main measure for evaluating will be the analysis of their data. Was their information reasonable, accurate, and consistent? Were they able to apply their information into the data analysis and were they able to conclude the appropriate connection between mass and speed? |